09/476588

ABSTRACT OF THE INVENTION

Antireflective structures according to the present invention comprise a metal silicon nitride composition in a layer that is superposed upon a layer to be patterned that would other wise cause destructive reflectivity during photoresist patterning. The antireflective structure has the ability to absorb light used during photoresist patterning. The antireflective structure also has the ability to scatter unabsorbed light into patterns and intensities that are ineffective to photoresist material exposed to the patterns and intensities.

Preferred antireflective structures of the present invention comprise a semiconductor substrate having thereon at least one layer of a silicon-containing metal or silicon-containing metal nitride. The semiconductor substrate will preferably have thereon a feature size with width dimension less than about 0.5 microns, and more preferably less than about 0.25 microns.

One preferred material for the inventive antireflective layer includes metal silicon nitride ternary compounds of the general formula $M_xSi_yN_z$ wherein M is at least one transition metal, x is less than y, and z is in a range from about 0 to about 5y. Preferably, the Si will exceed M by about a factor of two. Addition of N is controlled by the ratio in the sputtering gas such as Ar/N. Tungsten is a preferred transition metal in the fabrication of the inventive antireflective coating. A preferred tungsten silicide target will have a composition of silicon between 1 and 4 in stoichiometric ratio to tungsten. Composite antireflective layers made of metal silicide binary compounds or metal silicon nitride ternary compounds may be fashioned according to the present invention depending upon a specific application.

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